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ABSTRACT

This paper poses and generates the answers to six questions about the use of newer media in education and the areas of disagreement that seem to recur as new media become available for teaching. Cast in the context of videodisks, those questions ask whether: (1) videodisk technology is more effective than traditional media in promoting learning; (2) the visual nature of videodisk promotes more creative thinking by students; (3) media like videodisk, which present information in a more realistic way, enhance student learning; (4) students are more motivated to learn from newer media like videodisk than from more traditional media; (5) media like videodisk increase the freedom of instructional choice by students; and (6) videodisks are less expensive than teachers for some types of instruction. A brief discussion of the possibilities of using educational media to solve some of the problems of developing nations concludes the paper. (CGD)

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Title:

Symposium: Interactive Video Symposium: The Singer or the Song-- An Extension of Clark's Media Research Discussion

Paper #1: The Singer as Iconoclast: Six Arguments about the use of Video Disk For Teaching

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THE SINGER AS ICONOCLAST:
SIX ARGUMENTS ABOUT THE USE OF VIDEO DISK FOR TEACHING

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Paper presented at the 1989 annual convention of the
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THE SINGER AS ICONOCLAST:
SIX ARGUMENTS ABOUT THE USE OF VIDEO DISK FOR TEACHING

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March, 1989

Concerns about the use of newer media in education have a very long and distinguished history. The Greek philosopher Socrates was reputed to have criticized the use of the "written word" in teaching. In his dialogues with the slave Meno, he claimed that only oral instruction, delivered by a skilled teacher, could draw out the natural knowledge possessed by all students. His objection to the new medium of the written word was that it would make students "lazy" and "destroy memory". While the written word is today established as one of the "traditional" media for education, many of our arguments about the adoption of newer media such as video-disk sound similar to Socrates' objections to the written word. For example, today there are at least six major areas of disagreement that seem to reoccur as new media are available for teaching. Those six arguments stem from questions such as: 1) is video disk more effective than traditional media (teachers and books) for promoting learning?; 2) Does the visual nature of video disk technology promote creative thinking?; 3) Does the capacity of the video disk technology to present more "realistic" instruction enhance student learning?; 4) Are students more motivated to learn from video disk than from traditional media?; 5) Does Video Disk and CBT connections increase freedom of choice by students?; and 6) Are media less expensive than teachers for some types of education and students?

What I find interesting about using educational research to analyze these questions is that the best current answers to many questions are often "counter-intuitive". The best current answer to each of the six questions is considerably different than I had expected when I began my research.

1) Is Video Disk Technology More Effective In Promoting Learning Than Traditional Media?

The best and quickest answer to this question is "yes"... and "no". Yes, the research in the United States, Canada, Australia, Indonesia, Columbia, El Salvador and the United Kingdom provide dramatic evidence that television (and other new media) increase student learning an average of 20% over more traditional means of teaching. Once the video disk is more established we will probably find a comparable measure of effectiveness. But there is no evidence that the medium used causes the learning gains. Instead, the school achievement gains are probably due to efforts that accompany the introduction and use of new media such as curriculum reforms, increased investment of resources in designing lessons and in preparing students for instruction. It takes teams of specialists to develop, produce and present a video disk teaching program. Yet, newer media serve as an important "context" in which governments and educators increase the effort and resources invested in education. There is more agreement now among researchers that the same learning gains we measure from newer media would also be possible with traditional forms of instruction -- though our teachers have had a very difficult time adopting to newer methods of teaching.

Of course one of the claims made about newer media such as computers and video disk is that they allow for "interactivity" between student and teacher. While that may be true, other media including the oldest media -- teachers -- provide the same capacity. Video disks do not provide any form of interactivity which cannot be duplicated by existing technologies even though such a duplication in the case of certain instructional messages would be much less efficient.

Therefore, it seems that media are carriers or "vehicles" that transport instruction to students. The instruction carried my any media, new or old, might be effective or ineffective. This was the source of the analogy I used in my 1983 Review of Educational Research article, that media do not influence student learning any more than the truck that delivers groceries to a market influences the nutrition of the market's customers. But media are interesting and they attract the interests of educational reformers and workers. Newer media present the opportunity to lure more resources to education, and they permit the use of newer instructional methods that teachers

either reject or are too busy to use. The greatest advantage of the new media is that they adopt so quickly and easily to new developments in Instructional technique and curriculum change. They also have a capacity to perform instructional tasks that teachers either dislike or are unwilling to learn.

2) Does the visual nature of video disk promote more creative thinking by students?

Based on the great volume of research conducted in this area, the answer is clearly "no". Yet, there is good evidence from interviews with famous artists, writers and scientists that mental imagery is important for creative thinking. Albert Einstein, for example, reported gaining insight into his theory of relativity when he imagined himself being transported to the moon in a Viennese cable car. As the car approached the speed of light, Einstein recounted his surprise that the car became narrower and that time within the car slowed down relative to the time back in Vienna. Accounts such as this fuel our imagination and our expectations for the power of visual thinking. However, visual thinking might help creative thought (particularly for the educated scientist or accomplished artist) but there is no evidence that visual media increase or enhance visual imagery. In fact, the evidence suggests that one does not have to have strong visual imagination to do the most creative thinking. Many creative thinkers use verbal means to "imagine" ideas. There is even evidence that using pictures during reading instruction may interfere with the initial reading skills of children who are slow to read.

Why then does visual instruction seem to be such a powerful tool for education if the research evidence does not support its use? It appears that the formation and use of mental visual images is not necessarily helped by visual instruction but under some conditions, visual images seem to enhance thinking and problem solving. Visual imagery seems to be a talent that some of us are born with and others are not. People who are not able to have visual images find other means, mostly verbal, to represent visual events in their minds. In fact, a recent major study of visual imagery and visual problem solving found that highly verbal students with very low visual ability were just as successful as the most visual students in solving <u>visual</u> problems. This was a "counter-intuitive" surprise to many psychologists. Investigations about why the non-visual

students were able to solve visual problems suggest that they made good use of analogies and metaphor. It is my view that the advantage of visual imagery is that the "pictures in our minds" serve as a very powerful analogy of the problem being solved. In Einstein's trip to the moon image, the cable car was a convenient and concrete analogy for the three elements of the theory he developed - mass, velocity and energy. Such creative thinking may actually require the use of analogies, some of which are visual.

The practical application of this area of argument is to notice that we need to make greater use of analogies in all of our instruction. A recent study found that there was only minimal use of analogies in the textbooks and other instructional materials for teaching of mathematics and science. Yet, it seems that the use of concrete imagery greatly helps creative thinking and speeds up learning about complex concepts. We should keep this in mind when we develop new or traditional instructional media.

3) Media such as video disk present information that is more realistic. Does that enhance student learning?

During the 1950's and 60's in the United States there was a very famous theory called the "cone of experience". This theory suggested that the closer instruction came to depicting the way events were experienced, the more learning that was possible. This "realism", we argued, was not available in the artificial environment of most classrooms but it was available from movies and television. For example, many educators notice that the printed word only presents the student with "abstractions" of experience, whereas television and the cinema provide information to a variety of senses in a form similar to that encountered during an actual experience. The theory seemed sound because it was intuitively correct to a number of educators, myself included. Yet, there is no research evidence in favor of the theory and a considerable amount of evidence against it.

Why should realism not support learning? While there may be settings in which realism is helpful to learning, we have not yet discovered them. The psychological research on this subject suggests that "realism" adds many attractive but irrelevant parts to an instructional presentation. Students who are beginning to learn a new subject or who have difficulty learning seem often to be distracted by the

irrelevant aspects of realistic presentations. The most effective instructional presentations for new or slow learners is one which helps focus their attention and thinking on a few relevant concepts or principles. For the more advanced student, realism seems to neither help nor hinder learning.

4) Are students more motivated to learn from newer media such as video disk than from more traditional media?

The quickest answer to this question is an enthusiastic -- yes. The motivation encouraged by newer instructional media seems to be common in a great variety of nations, cultures and different types of individuals. This same enthusiasm seems also to be shared by the parents of students. This enthusiasm, I believe, accounts for some of the increased learning we find with some of the new media. Yet, even here there are two exceptions: 1) this motivation seems to diminish quickly; and 2) students seem often to be wrong about the effort it will take to learn from certain media.

One source of my claim that student interest in new media diminishes over time is the large number of research studies that have asked this question. In this research it is generally found that motivation decreases as the amount of time spent with a new medium increases. After one year with televised instruction, for example, most students are only as enthusiastic about it as they are about other alternatives. This same result is true of computers and the new video disk technology. While this decrease in motivation may be partly due to the poor quality of many instructional media presentations, I doubt that this is a significant factor. Generally, familiarity with media seems to bring acceptance but motivation decreases with familiarity.

Much of the reason for this motivational decrease, I believe, stems from inaccurate student beliefs about certain media. Some of the most exciting research being conducted at the moment, explores the effects of student expectations and beliefs about media. One of the most dramatic early results of this research is the finding that students think that some media are much less <u>difficult</u> than others. For example, students seem universally and wrongly to believe that books are much more difficult a source of information than is television. Their belief stems from the fact that

in most nations, television is a source of light entertainment and current events. Books seem more demanding by virtue of their traditional content for the student. Students reason that television makes learning easier and more entertaining. This is the initial source of their increased motivation towards it. Yet, a moment's reflection will establish that there is nothing about the written word that is necessarily more demanding than television. To a psychologist, it appears that students often use television in a "shallow" way. Whereas they are taught to read books they are not taught to "watch" television. This is the origin of the recent interest in "media literacy" training in a number of nations. We need to give more instruction to students on how to learn from new media.

The obvious problem with these beliefs is that many students will not invest enough intellectual effort to learn from "easy" media such as television. Less obvious is the fact that students seem to believe that computers are very difficult learning tools. Some students seem frightened and think that the new medium is excessively difficult. Literacy training, when it is successful, provides students with strategies for learning from new media. These strategies, when applied over time, eventually convince the student that no one medium is any more difficult or more easy than another for learning. It is the content of the medium that imposes difficulty on learning, not the medium. This may be why motivation for new media decrease over time until it equals motivation for more traditional media.

5) Do media such as video disk increase the freedom of instructional choice by students?

Nearly all psychologists would agree that different students learn best from different instructional strategies. This fact has been the force behind our interest in "individualizing" instruction, particularly at the university level and in some large, urban secondary schools. On the simplest level, students are allowed to choose, for example, whether they wish to attend lectures or to later listen to an audiotape of the lecture. On a more sophisticated level, individualized instruction involves the development of an entire course of study through specially designed workbooks, television programs and/or slide-tape presentations. These developed courses are offered as alternatives to the traditional lecture by a professor. Generally, students like to have choices. In American universities approximately half of the students offered

these choices elect the "individualized" media. It is thought, though not yet established, that such freedom of choice increases student motivation to learn and the intelligent effort they will spend on their own education.

However, there is a problem with this increased freedom to choose. Research by psychologists in the United States has established that some students seem to make the wrong choice for themselves. The most capable students who should choose the traditional instructional media (which is often less structured), instead choose the newer media (which is often more directive and structured). On the other hand, less capable students often choose the traditional lectures when they might learn more from the structured, newer media and teaching strategies. The reason for these less-than-perfect choices on the part of students is a misunderstanding of the consequences of their choice. More capable students believe that the more structured instruction will make their study more efficient and give them a better chance on their examinations with less effort expended. Less capable students seem to like the freedom of the less structured media though they do not learn as much. In some cases, they have the freedom not to expend so much effort and yet receive lower evaluations. So, while alternative media do provide more freedom to students and while they like this freedom, they do not always benefit from it.

Of course, it is possible to assign students to these new instructional programs which use the newer media. One of the more successful and dramatic successes of this approach is the Netherlands where one of the medical schools has changed its curriculum for the education of physicians to an individualized, problem solving approach. Instead of the traditional lectures and reading then examinations, this school gives students carefully planned problems to solve. Evidence in that nation suggests that medical students taught by this new plan are outperforming traditional students on all tests -- even though they are randomly assigned to the school.

6) Are video disk less expensive than teachers for some types of instruction?

The final question, about the cost of media, may seem to belong more to the study of economics than to psychology. Yet, assessing cost in education must involve the relative learning benefits of different kinds of media. Psychology investigates learning while our colleagues in economics are concerned with theories of value and market. In answering this question I am indebted to a number of economist colleagues. I will briefly present some of the conclusions of the economic research on two new media, television and computers:

There is good evidence that televised instruction can be made very inexpensive if its use is spread out over a great number of students. The current estimate for the cost of our very successful children's television series, Sesame Street, is about $.50 US per viewing child, per year. Considering the evidence that this program helps our children learn to read faster, the cost is low. This may be one of the reasons why Sesame Street has been translated into over 20 languages and has been acquired for broadcast in many nations. Most important was the decision of the producers of this program to develop their programs using teams of teachers, psychologists and artists. Television is increasingly interesting as a delivery medium for education in nations where economic hardships prevent the building of adequate classrooms or the training of sufficient numbers of teachers.

Recent studies show that computerized instruction is seldom fully utilized in any school. We have learned that computers and other media take a great deal of effort to successfully blend with other school activities. If fully used however, the cost of computers for instruction is much less than most of us had expected and its learning benefits are potentially greater if adequate instructional programs are used. One interesting result of our research is to note that the cost of the same computerized instructional program may change a great deal between schools and between nations. We think that this may be due to the way in which schools implement media and with the attitude of teachers. There appear to be some management and organizational plans that are more efficient and effective than others for the production and use of new media.

It may also be possible that video disk technology will be a much more efficient way to provide interactive teaching. At the moment there is no compelling evidence for or against the claim of efficiency. In fact, Henry Levin at Stanford finds that for most purposes requiring interactivity in teaching, teachers aids paid at minimum wage levels were much more cost-effective than computers. Why should we not find the same thing to be true with video disk and computer marriages?

Conclusion

As a researcher, I remain committed to the use of media in education. When combined with supportive teachers, carefully planned lessons and a sympathetic educational system, it can be very effective and inexpensive. I think that it is very unrealistic (but interesting nonetheless) to consider what an educational system would be like if it were primarily delivered by newer media. Yet I am most interested in the possibilities of media to solve some of the problems of developing nations and the children of the poor. It is clear that we have not yet achieved a fair distribution of educational benefits in the third world, nor in some of the minority groups in the first world. These children of the poor require high quality instruction if they are to take their rightful place in their own communities. The technology of education which has been developing these past two decades could, if properly implemented, provide one critical part of the incentive these children need to obtain an education. In this regard, I am impressed with the progress being made in using media by nations such as The Peoples Republic of China, Indonesia, India and Mexico. Many of the problems encountered in these new media programs show us that the "transfer" of technology between nations is a difficult task. It requires a great deal of communication and honesty. For those of us who specialize in research and theory, it requires most of all a willingness to let our rational and substantive concerns about learning from media control our enthusiasms.